Contribution ID: **9** Type: **Oral**

Vibrocorer for Sampling of Subglacial Sediments in Antarctica

Wednesday 2 October 2019 11:00 (20 minutes)

Core sampling from beneath Antarctic subglacial environments offers unique opportunities for examining processes acting of overlying ice. Basal aquatic sediment materials contain important paleo-climatic and paleo-environmental records even more than ice cores, provide unique habitat for life, give significant interactive information between ice bottom, subglacial hydraulic system and the sediments. Sediment coring tools need to pass through the hot-water access borehole and water column before the coring processes, therefore, the corer radial size and its coring ability become the two key points. Several projects have already obtained good cores from Antarctic subglacial environments, but the core lengths were quite short, generally in a 0.1-2 m range. Vibrocoring is a simple and efficient technique for obtaining high–quality long sediment core samples in a variety of configurations and sizes, however, vibrocorers used in deep ocean waters unable to be deployed to subglacial environments due to their oversized vibro-heads that cannot pass through the access borehole. We proposed a vibrocorer built especially for subglacial sediment sampling settings. Techniques, materials and core operation methods are designed on the base of the clean access requirements. An innovative cylindrical vertical vibration system was developed and tested in experimental well with simulated subglacial sediments. The vibrocorer is planned to be used in Antarctica in 2019-2020 season.

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Session Classification: Session 5